



Ensuring Life Cycle Supportability through the Application of Systems Engineering Processes

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- **Overview**
- **Introduction**
- **Technical Description**
- **Approach**
- **Implementation Process**
- **Results**
- **Summary**

OVERVIEW

- **Successfully Demonstrated Life-Cycle Supportability for Large-Scale COTS Training Technology Insertion Program through the Application of Systems Engineering Processes**
- **Provided Processes and Capabilities to Support Implementation Requirements and Expanded Engineering Focus on Total Training System**





INTRODUCTION

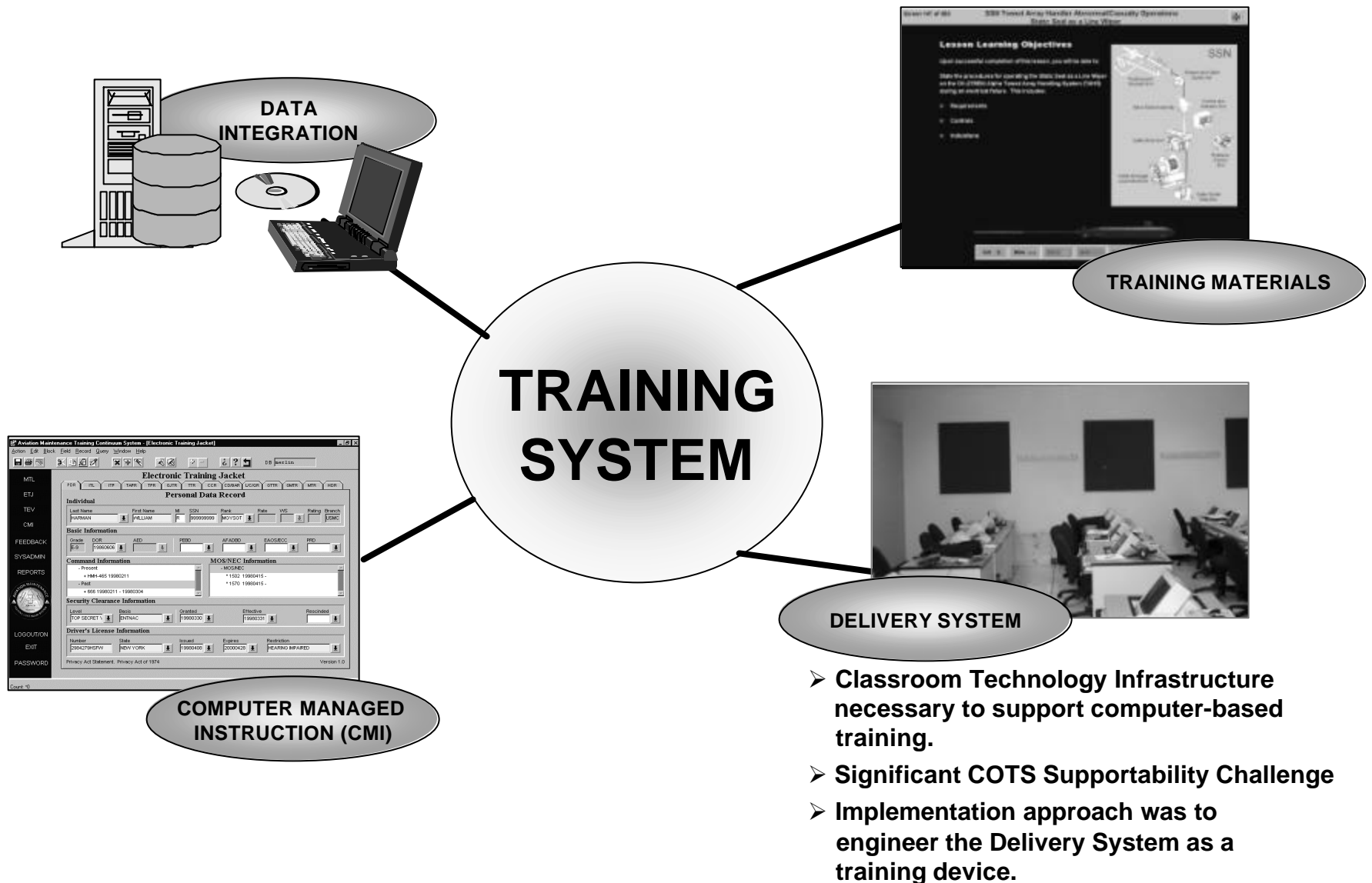
- **Description**

- **Large Scale COTS Training Technology Infusion Program**
 - ❖ Implementation of PC/LAN Based Electronic Classrooms
 - ❖ Multi-Year Implementation
 - ❖ Planned Implementation of 200+ Classrooms
 - ❖ Dynamic Requirements/Technology Environment

- **Objectives**

- **Focus on Customer Needs by Addressing Functional, Product Implementation and Life-Cycle Requirements**
- **Provide Manageability of COTS Technology Cycles**
- **Provide Life-Cycle Management at the Lowest Possible Cost**

TECHNICAL DESCRIPTION



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- **Training Device**

- **Pentium II Personal Computers**
- **Windows NT 4.0 LAN**
- **Dual Processor Pentium III Servers**
- **Server Farm**
(3-8 servers, 20-500 clients)
- **Document Camera**
- **Video Control System**
- **Printer**
- **Projector**
- **Interactive White Board**
- **Local Area Network**



- **Typical Installation**

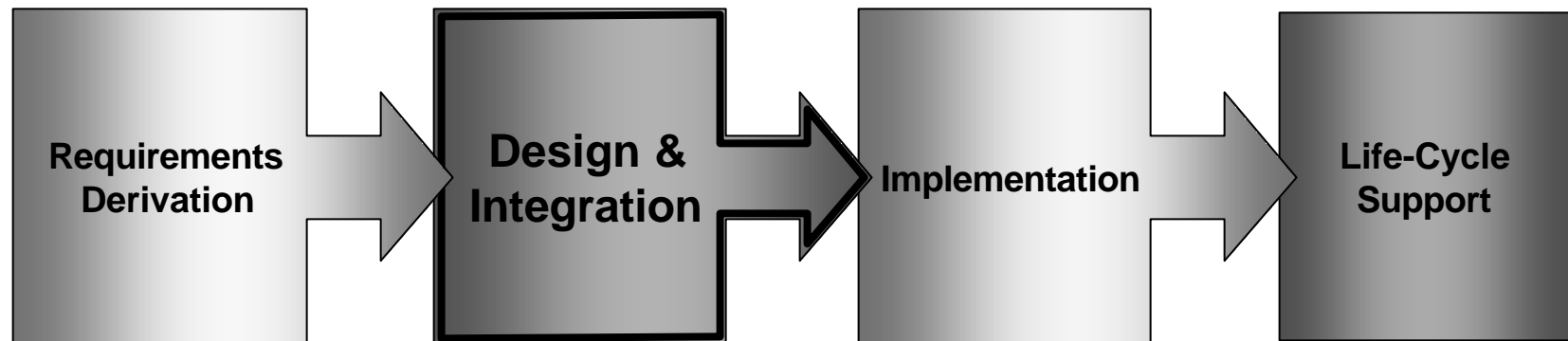
- **5 Electronic Classrooms**
- **90-120 Personal Computers**
- **3-5 Servers (PDC, BDC, 1-3 Application Servers)**



APPROACH

- **Design Utilizing a System Life-Cycle Focus to be Simultaneously Responsive to Customer Needs and Life-Cycle Outcomes**
 - ***Life-Cycle Model***
- **Perform a Life-Cycle Cost Analysis to Assure Final System Design Complies with Program Supportability Requirements**
 - ***Design and Integration Process***
- **Implement a Configuration Management Model to Account for Future Customer Requirements, Product Improvement, and Evolving Technology**
 - ***System Configuration Management Process***

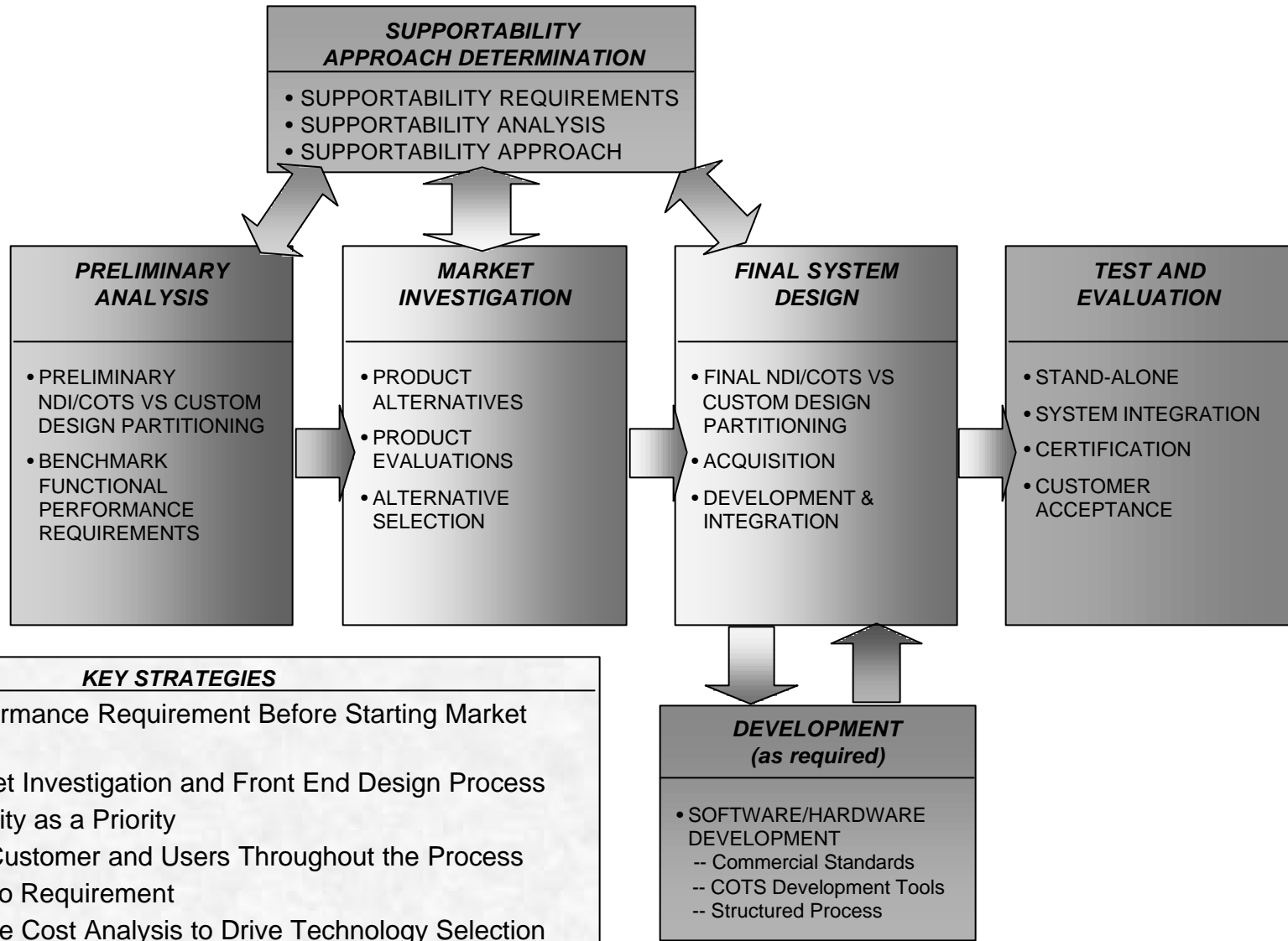
Life-Cycle Model



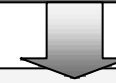
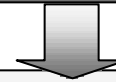
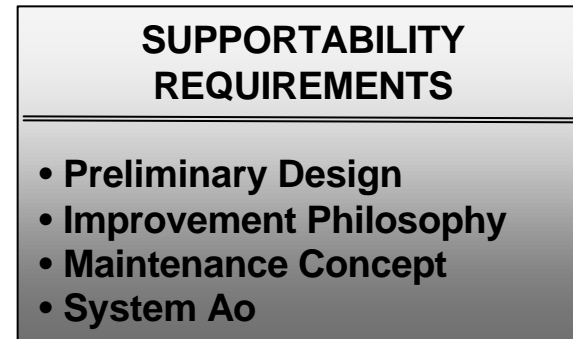
- **Model Adapted to Support Rapid Applications Development Approach**

APPROACH

Design & Integration Process



Supportability Approach Determination



$$Ao = \frac{\text{Mean Time Between Failure}}{\text{Mean Time Between Failure} + \text{Mean Down Time}}$$



APPROACH

System Configuration Management Process

What We Have . . .

- ✓ **Classroom Design Baseline**
- ✓ **Supportability Program Coupled with Classroom Design that meets Ao Requirement**

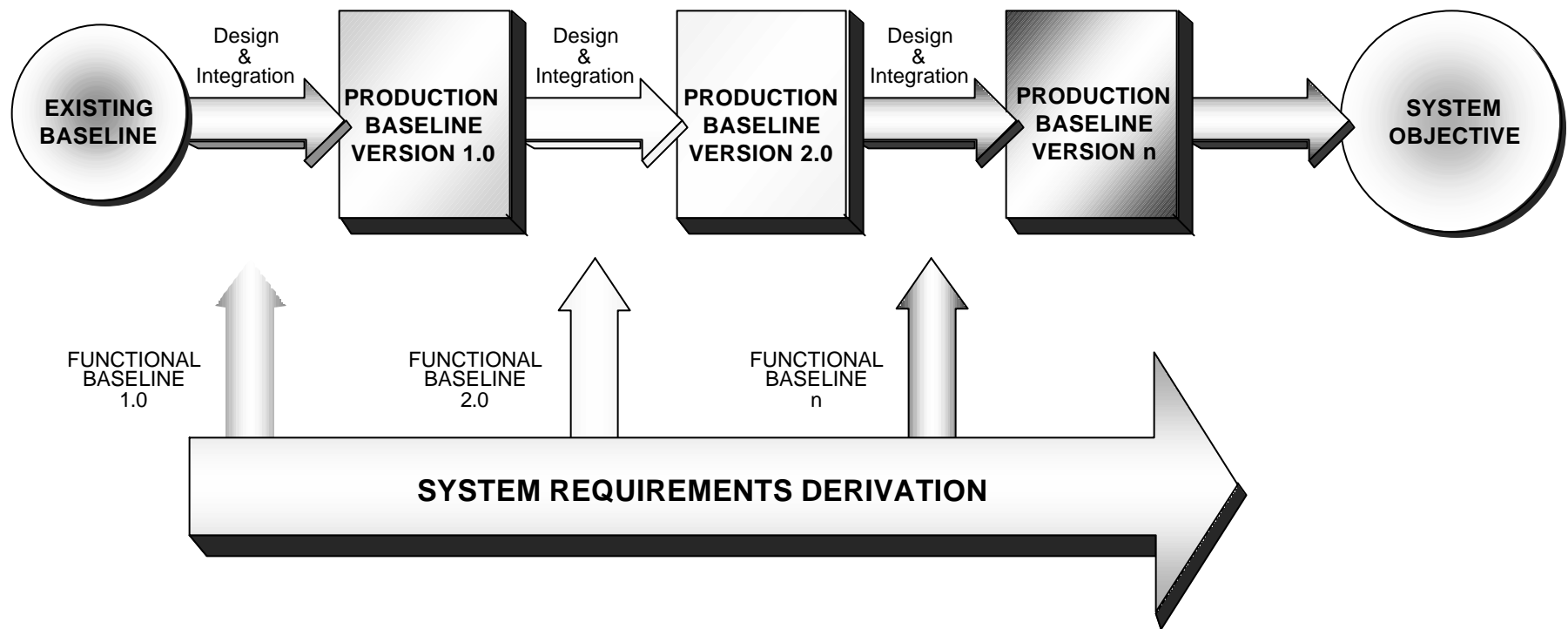
Further Challenges . . .

- **Management of Dynamic Requirements Environment**
- **Management of Rapid Technology Cycles**

Approach . . .

- ❖ **Implement Planned System Improvement Process Model**

Planned System Improvement Process Model



- Formal Process for Ongoing Systematic Evolvement of System Requirements (Functional Baselines)
- Establishes Design and Integration Cycles to Produce Evolving System Baselines (Product Baselines)
- Provides System Configuration Control Process for Managing Baseline Improvement



APPROACH

System Configuration Management Process

What We Have . . .

- ✓ **Classroom Design Baseline**
- ✓ **Supportability Program Coupled with Classroom Design that meets Ao Requirement**
- ✓ **Planned System Improvement Process Model that Provides:**
 - **Management of Dynamic Requirements Environment**
 - **Management of Rapid Technology Cycles**

Further Challenges . . .

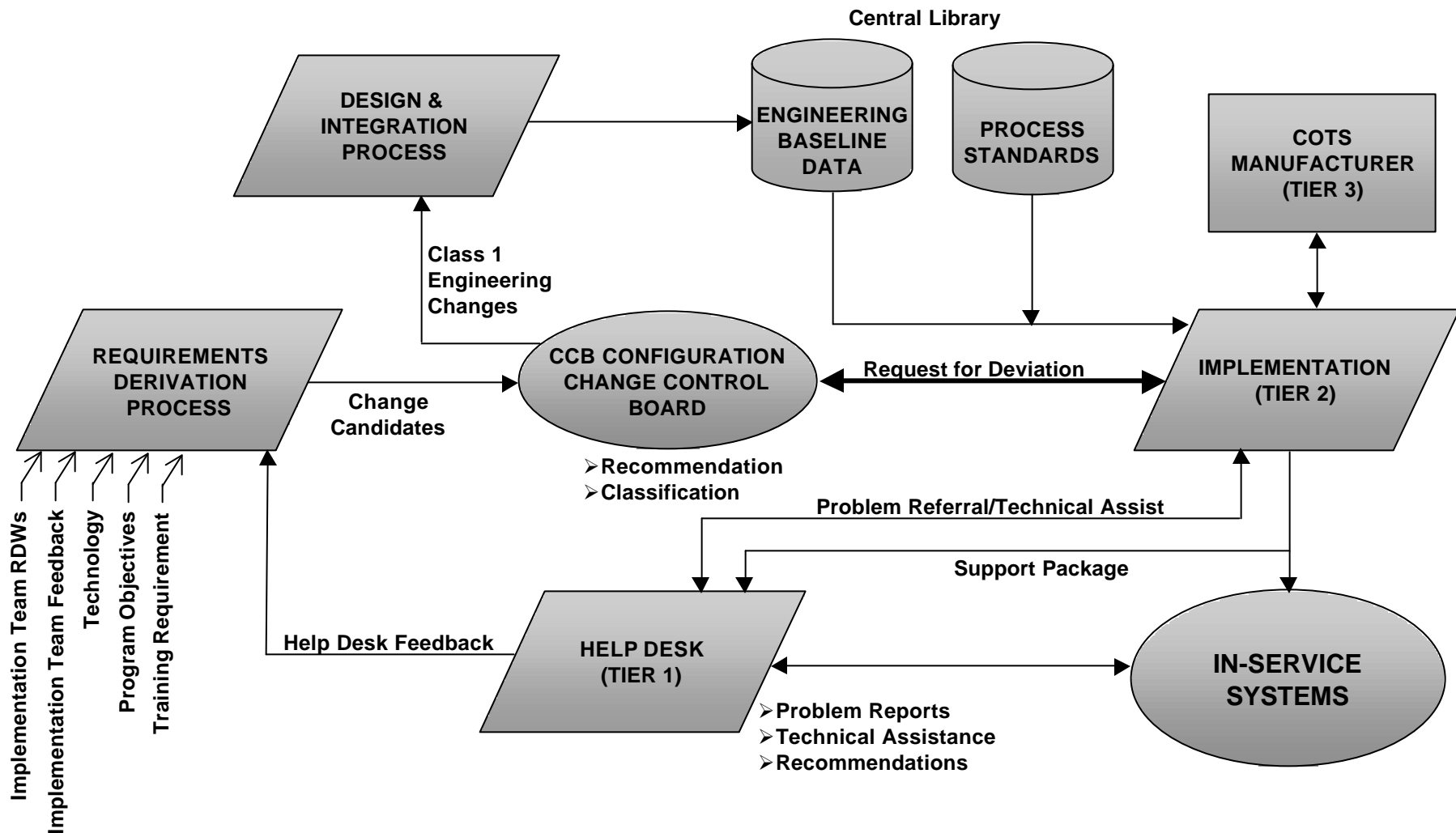
- **Management of Multi-Year Implementation**

Approach . . .

- ❖ **Implement System Configuration Management Process**

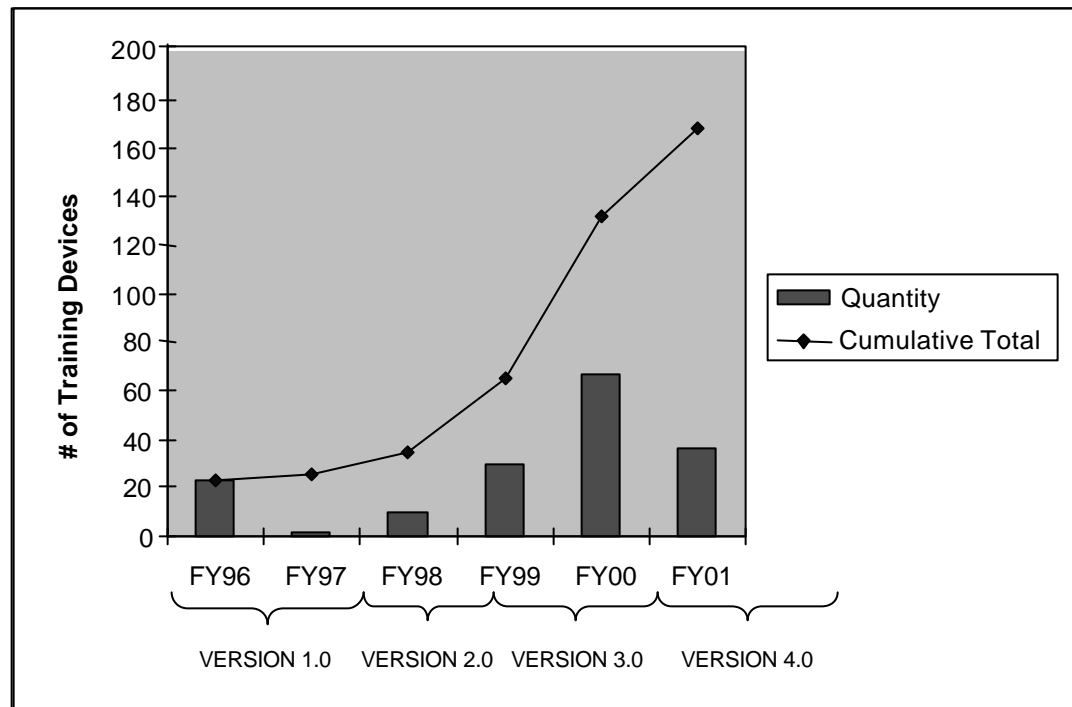
IMPLEMENTATION PROCESS

System Configuration Management Process



RESULTS

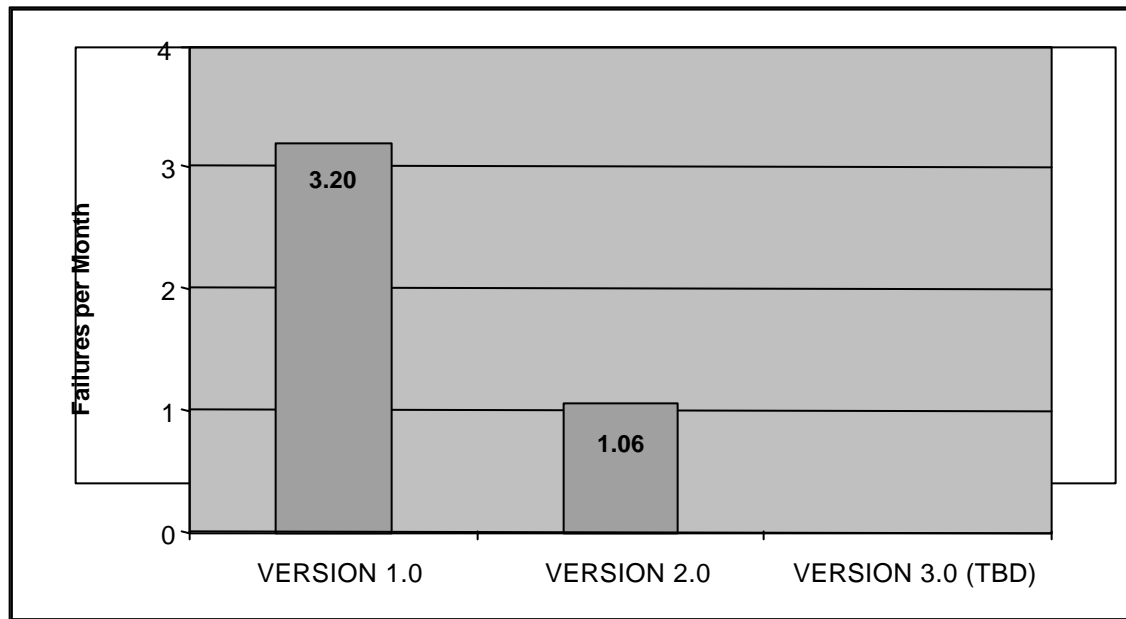
Training Device Installations



- **168 Training Devices Field-to-Date**

RESULTS

Failure Rate Based on Time in Service



Note: Version 3.0 was implemented from mid-FY99 through the end FY00. Failure data is currently being collected and processed.



SUMMARY

- ***Over the past 5 years have designed, implemented, and provided Life-Cycle Maintenance for close to 200 COTS-based Training Devices.***
- ***Systematically reduced Life-Cycle Maintenance costs per each product base.***
- ***Developed and implemented several processes and capabilities and have successfully applied them to other business ventures.***

